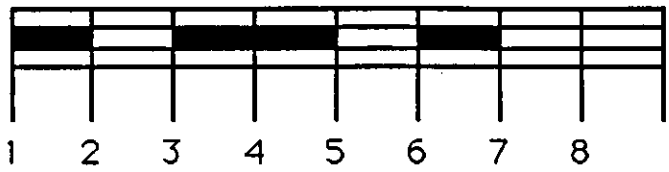
Algorithm programming:

Programming algorithms requires an initial analysis of the music to be altered. For this example, we will assume that we are trying to impart "feel" to a rhythm sequence. The sequence for one measure consisting of four eighth notes of a tom drum is shown below graphically:



If we need to advance the downbeat forward in time in order to gain an insistent downbeat, the screen would be programmed as follows:

```
AL1 PLC TMvI PT8
+8 0 0 0 0 0 0 0
```

From this screen, the following parameters are incorporated:

1) the assigned ALGORITHM number is "1."

2) the algorithm analyzes incoming MIDI data by PLACEMENT in time.

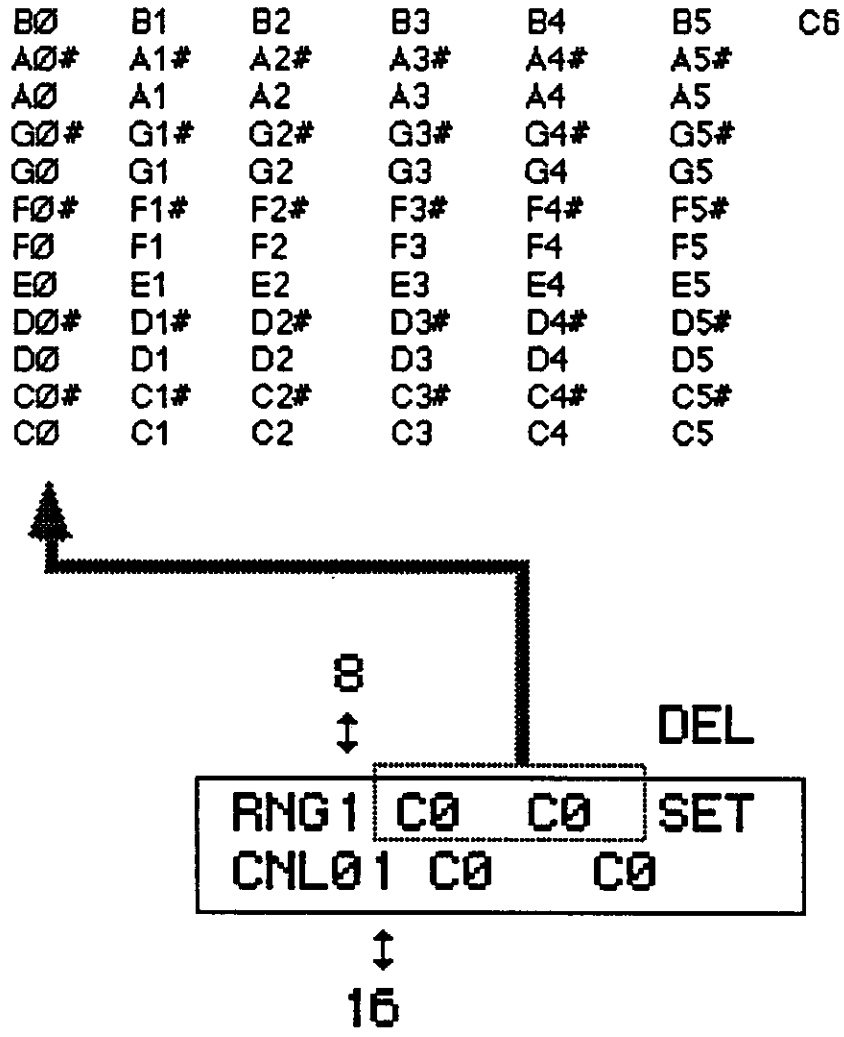
3) the algorithm imparts "feel" by creating TIMING offsets only.

4) the incoming MIDI data is broken down into PATTERNS of 8 eighth notes.

5) only the first eight note is offset forward in time by 8 "feel units."

Range Programming Screen:

The Range Programming Screen is used when you want the *Feel Factory* to affect only a certain range of MIDI notes within a single MIDI channel. This is useful in instances where the entire rhythm section is coming in on a single MIDI channel (instead of each instrument on separate channels) and you want to selectively limit what notes are affected by the *Feel Factory*. A single note may be put in a range (C1 C1), a range of notes (C1 D2) or scattered notes (C1 C1) then press GO/SET, (D1 D1) then press GO/SET, (E1 E1) then press GO/SET, and so on.


BØ B1 B2 B3 B4 B5 C6
AØ# A1# A2# A3# A4# A5#
AØ A1 A2 A3 A4 A5
GØ# G1# G2# G3# G4# G5#
GØ G1 G2 G3 G4 G5
FØ# F1# F2# F3# F4# F5#
FØ F1 F2 F3 F4 F5
EØ E1 E2 E3 E4 E5
DØ# D1# D2# D3# D4# D5#
DØ D1 D2 D3 D4 D5
CØ# C1# C2# C3# C4# C5#
CØ C1 C2 C3 C4 C5
8
DEL
RNG 1 CØ CØ SET
CNLØ1 CØ CØ
16

RNG 1 – 8: this setting controls the screen display of which RANGE you are currently programming. Up to eight different ranges can be specified for use in the FADER ASSIGNMENT SCREEN.

CØ CØ (top pair): range information is defined as the low and high limits of the range. The complete list of range values is given above. The first value of the pair defines the lower note value and the second value sets the upper limit. If both note values are set to the same note, then only a single note is affected.

Scattered notes can be achieved by selecting a single note, the pressing the GO/SET BUTTON and then selecting another note and pressing GO/SET and so on, etc.

Range can be set by moving the cursor to the position occupied by either the lower or upper value, and then clicking on either the UP or DOWN arrow button. Setting the lower value will also change the upper value simultaneously. This is a time-saving feature so that if you want to specify only a single note value, the upper value will already correspond to the lower value. And if you require more than a single note to be specified, you will only have to increment the upper value by the number of notes from the already set lower value, and not from the default value of "CØ."

Shortcut: An even easier feature is setting the note range directly from the MIDI keyboard. Place the cursor over either the lower or upper value you wish to set. With your MIDI keyboard connected, strike the key corresponding to the note value you wish to set. Then click the GO/SET key once and the *Feel Factory* will automatically read in the note received plus its MIDI channel and input it as either the lower or upper value depending on cursor position.

SET, DEL: SET is for setting the contents of the Range Assignment screen into memory. Once you have completed defining a specific range, you must activate SET before you go to another screen or setting another range. Otherwise you will lose the entire contents of the screen.

SET is accomplished by moving the cursor over the word "SET," and clicking once on the GO/SET button. The entire contents of the screen is then stored into memory.

DEL is to DELETE or erase the contents of a range setting. First select the range (1 – 8) that you want to delete. Then place the cursor over the word "DEL," then click once on the GO/SET button. If the screen displays the word "SET" instead, then move the cursor over the word "SET" then click once on the UP arrow button to change it to "DEL," then click on the GO/SET button.

CNL Ø1 – 16: A MIDI channel must be associated with each note range. You would not want the *Feel Factory* to play with every C2, for example, just the C2 that is being put out by the drum machine. Therefore a MIDI channel must be assigned to every note range.

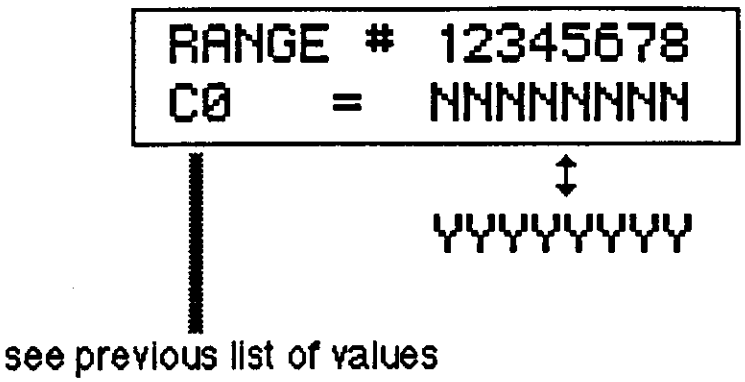
CØ CØ (bottom pair): this set of note values allows you to reassign the MIDI note value of any incoming note to another outgoing MIDI note. The first value of the pair is the value of the incoming note, and the second value in the remapped outgoing value. This is necessary if you are using a built-in sequencer on a drum machine which does not allow you to turn off "local echo." The *Feel Factory* functions by delaying all incoming signals by 33 milliseconds, or one SMPTE frame. However, if your sequencer is part of your drum machine, the sequencer will simultaneously trigger the drum sound as the sequencer is sending out the same information to the *Feel Factory* ("echo keyboard" or "local echo" is the usual term describing this effect.) The problem arises when the *Feel Factory* receives the incoming information, delays it for 32 milliseconds, and then sends it back out to the drum machine. Everything the sequencer plays will be echoed!

Most drum machine/sequencers unfortunately do not let you set local echo off. The *Feel Factory* can compensate for this effect by remapping the MIDI note value and then turning the velocity of the original note value off. If the drum machine is sending out a marimba as note value C2, this screen allows you to remap the note as F2 (a cowbell, or some other note not used in the sequence.) Then by turning off the velocity on the marimba at the drum machine, the drum machine sequencer will still send out a C2, but since the velocity is off, you will not hear anything. But C2 is still sent to the *Feel Factory* where feel is added to it, except that it is now remapped and sent out as F2 back to the drum machine. The cowbell will now sound instead of the marimba.

You can set the remap feature by moving the cursor to the first of the pair of note values, then click on the UP/DOWN BUTTONS until the MIDI note value of the original sound is selected. Then move the cursor to the second value in the pair and select the note value that will replace the first value selected.

Range Value Screen:

This screen serves as a reference screen for the previous RANGE PROGRAMMING SCREEN. It provides a quick method of identifying which of the programmed ranges will affect any specific note.

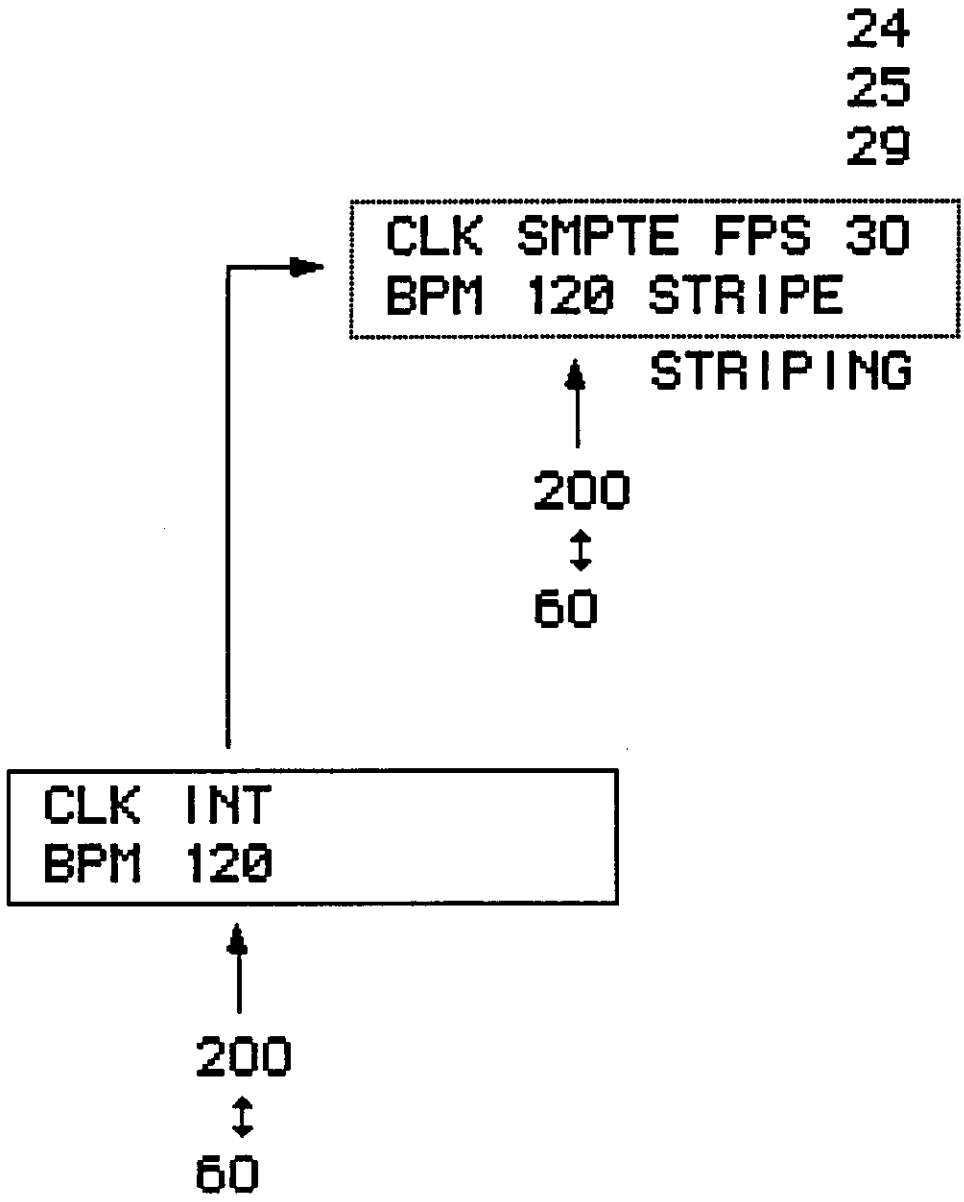


By default the cursor will be over the note value "CØ." By clicking on the UP or DOWN arrow button until you reach the note you are interested in, the rest of the display will indicate which range(s) will affect that note. The eight possible ranges are displayed on the top line, and the bottom line is a status indicator. N indicates "NO" while a Y indicates "YES." The range indicated by the number immediately above the corresponding N or Y.

It is also possible to assign or delete a note to a specific note range from this screen. You can see from this screen that a single MIDI note or range of notes can be assigned to several note rangers at once to accomplish complete *Feel Factory* effects.

CLOCK / SMPTE Screen:

This screen controls the timing function of the *Feel Factory* . It is possible to make the *Feel Factory* the master clock for your sequencer or drum machine by setting the drum machine or sequencer on external MIDI clock and setting the *Feel Factory* to INT (INTERNAL.) Toggling the GO/SET BUTTON will alternately run/stop the sequencer. The tempo at which the sequencer or drum machine will play is adjusted by changing the BPM (BEATS PER MEASURE) setting on this screen. In addition, it also controls the SMPTE features built into the *Feel Factory* .



This screen is actually two screens in one. The default screen is the screen on the bottom left, in which the sequencer is controlled by the internal clock of the *Feel Factory* and triggered by clicking on the GO/SET button. (See previous section on using the GO/SET button in the beginning of this manual.)

BPM 12Ø: this value represents the BEATS PER MEASURE setting of the *Feel Factory* . In its default state, the BPM is set at 120 which is usually the default settings in most sequencer. However, if your sequence requires a different BPM, or if you wish the sequence to play slower or faster, you can set a different BPM.

CLK INT: this setting controls the triggering of the sequence. In the default state, the CLOCK is triggered INTERNALLY, and starting and stopping the sequence is controlled by the GO/SET key on the *Feel Factory* .

CLK SMPTE: placing the cursor over the word "INT" and clicking on the UP arrow button will change the screen to SMPTE mode. Please refer to the top left screen for the following settings:

FPS 3Ø: this setting sets the *Feel Factory* to read and write SMPTE at the appropriate FRAMES PER SECOND. You have four choices covering the majority of longitudinal SMPTE formats currently in use.

STRIPE, STRIPING: this setting is used to stripe tape with longitudinal SMPTE time code.

To stripe a tape, place the cursor over the word "STRIPE." Then with a studio quality tape deck connected and the recording level set to -7 db, beginning running the tape and then click on the GO/SET button once. The screen will now display "STRIPING" to indicate that the *Feel Factory* is now outputting SMPTE. Note that the SMPTE type (FPS) must be selected before you begin striping the tape. When the tape is finished, click once again on the GO/SET button to stop striping. It is suggested that each song be striped separately as opposed to striping the whole tape at once.

Striping begins at the default value of 00 minutes, 00 seconds and 00 frames. To begin striping at a different point, please see the description of the next screen: SMPTE PROGRAMMING SCREEN.

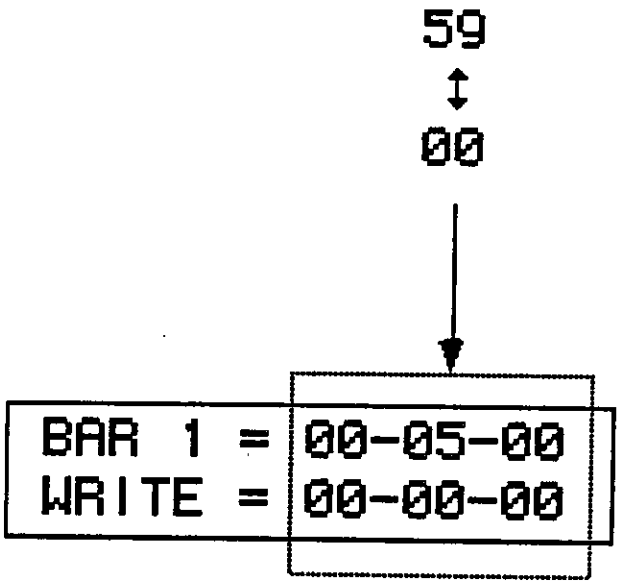
To trigger a sequence from SMPTE, see the description of the next screen.

SMPTE INDICATOR: note that the word "smpte" is in lower case on the screen. When the *Feel Factory* achieves proper sync, the word "smpte" will switch to "SMPTE" (upper case.) If there is a SMPTE sync error, the word "SMPTE" will revert to lower case. This is a good indicator of the quality of SMPTE that the *Feel Factory* is receiving.

SMPTE Programming Screen:

This screen operates in conjunction with the previous screen to control the reading and writing of SMPTE.

When reading or striping SMPTE, the tape recorder input and output must be set to approximately -7 db. The *Feel Factory* requires a clear SMPTE signal to operate properly. Note that dirty tape heads, old tape or crosstalk from adjacent tracks will adversely affect the reading of SMPTE. We further suggest that the output from the track on the tape machine that the SMPTE is on be connected directly to the *Feel Factory* as opposed to going through a patch bay. This will reduce crosstalk of SMPTE onto other tracks and vice-versa.



BAR 1: BAR 1 controls the point where incoming SMPTE will trigger the *Feel Factory*. At the default setting, the sequencer will begin at 00 minutes, 05 seconds and 00 frames, and subsequent songpointer positions will be referenced from there. You can set the BAR 1 point to another location by setting the appropriate values. Do not set it for less than 05 seconds since it will require at least that amount of time for the *Feel Factory* to lock on to incoming SMPTE.

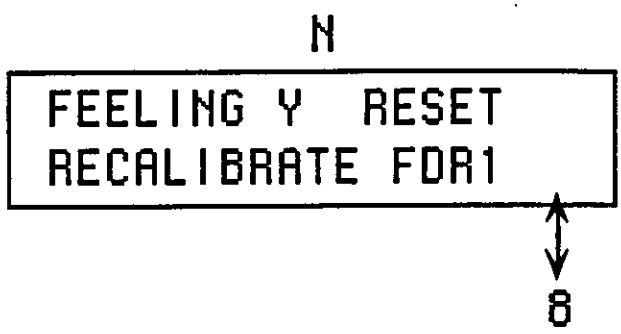
WRITE: this setting controls the beginning point when striping SMPTE. If you set it to a different point, please remember to reset the READ point (above) to at least 05 seconds after the new WRITE point in order to allow time for the *Feel Factory* to lock up to SMPTE presets.

SMPTE and the *Feel Factory* : If you choose to use a SMPTE to MIDI converter other than the one supplied in the *Feel Factory*, this procedure should be followed when MIDI is flowing through the *Feel Factory*.

1) Make bar 1 on the SMPTE to MIDI converter 1 frame earlier (00:05:00 becomes 00:04:29)

When syncing to tape with the SMPTE converter in the *Feel Factory* , then set bar 1 to it's normal location.

Utility Screen:

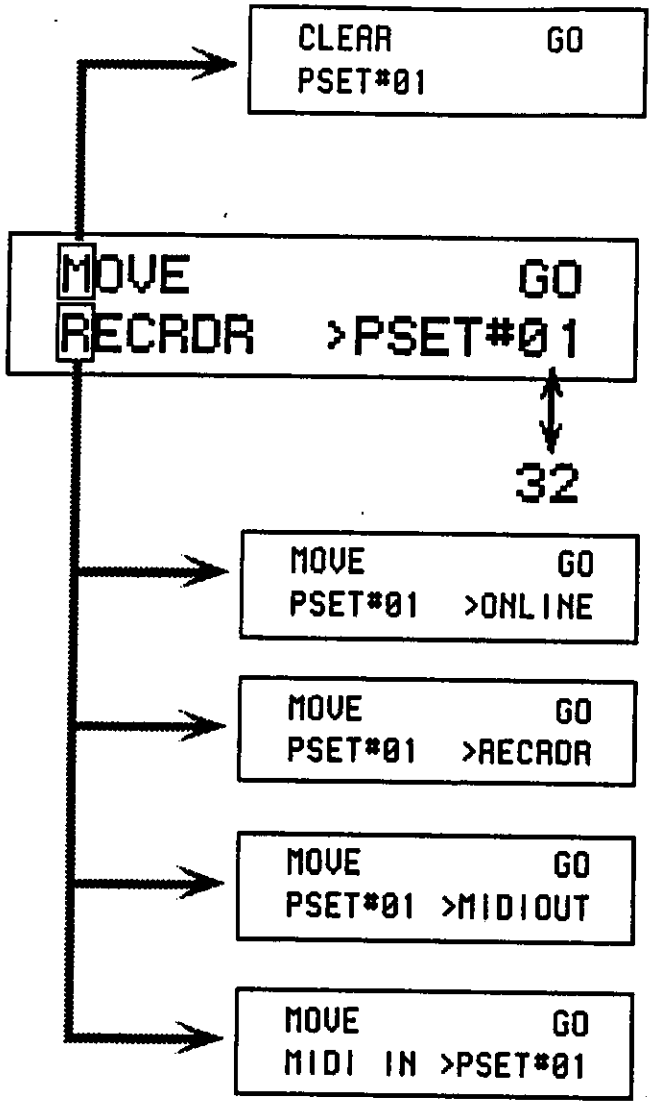


FEELING Y: Use the UP/DOWN BUTTONS to toggle between FEELING Y (*Feel Factory* engaged) and FEELING N (*Feel Factory* not engaged) to get a comparison between how the music sounds with the *Feel Factory* in or out.

RESET: put the cursor over PRESET and press the GO/SET BUTTON. This will reset the machine to it's default condition. If there is something in PRESET #1, it will be automatically loaded into ONLINE (same effect as when cycling the power off and on.)

RECALIBRATE FDR1: The *Feel Factory* has an auto-null feature in which you may set the fader to wherever you wish, move to this UTILITY SCREEN, and by selecting the fader number by clicking on the UP/DOWN BUTTONS, and then by pressing the GO/SET BUTTON; the new position of the fader will now read zero (Ø.) This is useful if you need more on top or behind the beat effect and the fader is already at the end of its physical. If for example, the fader you are moving is already at the top position and you still need it to go further, you can pull the fader to the bottom, reset the fader, and then you will now be able to raise the fader value even higher.

PRESETS:



Before we jump into this screen, perhaps a little overview is in order. The memory storage of the *Feel Factory* is a tad unconventional, but once you get what's going on here, you'll find it extremely powerful and easy or my name's not Tim Tully (which it's not, but that's beside the point).

The *Feel Factory* saves only the changes that are made instead of a "snapshot" of the entire machine. Think of presets as a series of overlays. A preset may be the entire machine (if everything has been changed) or just one fader move (moving the snare in the chorus.) A preset may be your favorite algorithm which then could be overlayed (RECALL PRESET) onto another feel without disturbing anything, but that particular algorithm. PRESETS may be recalled, modified, and resaved. When you recall a preset, the information is placed both into ONLINE and the RECORDER. The RECORDER may be cleared like wiping clean a slate to save only new changes.

There are three different areas of memory in the Feel Factory:

1)ONLINE

2)RECORDER (shown on screen as RECRDR)

3)PRESETS (shown on screen as PSET#Ø1)

ONLINE: I picked up this term from when they put a nuclear reactor in service or "ONLINE" This part of memory is where the *Feel Factory* looks to get the timing/velocity offsets it uses to massage the MIDI that is passing though it. Another way to say it is that this is the **active memory** that is affecting your music.

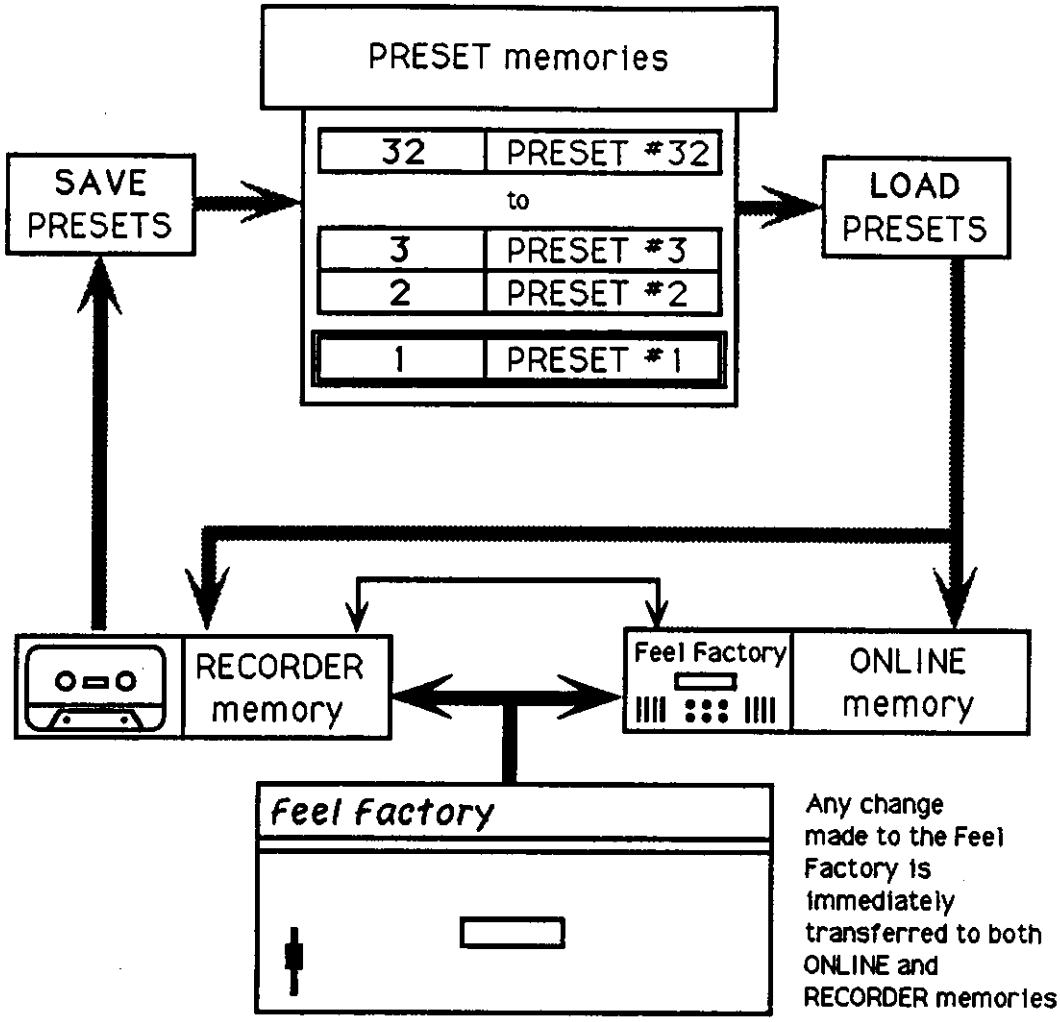
RECORDER: Fantasize with me a moment and pretend that you are changing different things on your *Feel Factory*, i.e. moving a fader, putting another value in an algorithm, changing a note range, whatever. Let's pretend that you have an assistant with pad and pencil and everytime you **change** something your assistant writes it down. That's exactly what the **RECORDER** is doing.

Everytime you change something on your *Feel Factory*, not only does it change the **active memory** , but that same change is written in the **RECORDER.**

This is what you have to get. Unlike normal memory schemes which save everything in each preset, in the *Feel Factory* you save **only the changes!** The room spins at the implication of this, you say. (Or what the xxx is he talking about may be an alternate response.)

PRESETS: This is the area of memory in which the **changes** written in the RECORDER are stored.

So the path of the information looks like the following diagram:



Follow me along an imaginary journey though a preset save.

First, realize that when you power-up the *Feel Factory* there are default settings already in place in ONLINE (active memory). For example, Fader#1= MIDI channel 1, Fader#2 = MIDI channel 2, etc. Now what if you like the defaults except that you want Fader#2 to control MIDI channel 7 instead. Everything else is fine, you just want MIDI channel 7 on Fader#2 for this song. Well, you go and change it and your imaginary assistant writes that change on the RECORDER. So now the only thing that is in the recorder is that one change.

Now you want to save it. You MOVE the RECORDER into PRESET #2 (or 3,4,5) and that change which was recorded in the RECORDER is now sitting in PRESET #2.

Next day you power-up the machine and you want to work on that same song. You MOVE PRESET #2 into ONLINE and presto-chango the **change** you made yesterday is put into active memory (ONLINE) and fader#2 is now on MIDI channel 7.

This scheme is extremely efficient in saving memory space and processor time, so you can store many presets without chewing a ton of RAM and recall them without slowing the realtime MIDI down. Also, it allows you to store a favorite algorithm as a preset and stick it into ONLINE without disturbing anything else. (I think I said that, but it's too cool.)

Everyone has their own way that they set up their MIDI channels, drum notes, etc. I suggest that you put your basic setup (channels,note assigns, etc) in Preset #1. If you do, when you power-up the machine, the code will automatically look and see if there is anything in Preset #1, and if there is, place those changes into ONLINE. So in this way when you power-up your *Feel Factory* is already personalized.

Look at the following screens and get familiar. Then I'll take you through a minor exercise that will clear up any confusion that still may be lurking in the murky corners of your brain.

PRESET FUNCTIONS:

There are four functions available and a total of 32 presets available for your use.

1) RECORDER to PRESET#ØØ: Once your turn on the *Feel Factory* , any adjustments or settings you make is recorded immediately by the RECORDER. The current settings in the RECORDER can then be transferred to any one of 32 available PRESET locations numbered #Ø1 to 32. To store current RECORDER settings, simply select this screen and select the number of the PRESET location that you wish to store it in. Then position the cursor over "GO" then press the GO/SET button once.

2) PRESET to ONLINE: this function is to load a stored PRESET into the *Feel Factory* for ONLINE use.

3)PESET to MIDI OUT: this function allows for the transfer of preset information via MIDI to an external sequencer or other device which can store SYSEX (SYStem EXclusive) information. This can give you more storage options in addition to the ability to automatically download PRESETS from your sequences.

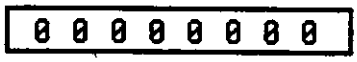
4) MIDI IN to PRESET: this function retrieves externally stored information and stores it to an internal PRESET location.

PRESET EXERCISE:

1). Get some milk and cookies.

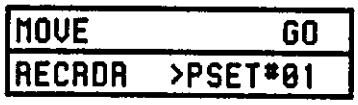
2). Cycle power off then on to the *Feel Factory* .

3). Cycle through the different screens until the ALGORITHM SCREEN is displayed. The bottom of the screen should look like this:



4) Change the ALGORITHM SCREEN to look like this:

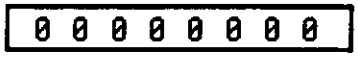
5) Cycle through the screens until the PRESET SCREEN is displayed. The screen will look like this:



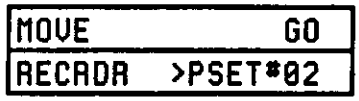
6) This says "Move the contents of the RECORDER (RECRDR) into PRESET (PSET) #1. Place the cursor at the end of the second line (so its flashing over the #Ø1) and then click the UP BUTTON once so it now reads "#Ø2." We are going to move the contents of the RECORDER into PRESET #Ø2. Remember that the RECORDER holds the changes that you've just made to the algorithm.

7) Move the cursor over the word "GO" and press the GO/SET BUTTON. The "GO" will change into "OK" to tell you that the save was successfully made. If there is not enough room left in memory, the "GO" will not turn into "OK." (It is unlikely that you will run out of memory if you avoid storing entire *Feel Factory* settings into each and every PRESET.)

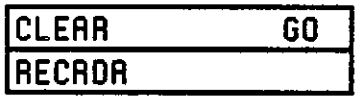
8) Go back to the ALGORITHM SCREEN and make the algorithm look like this again:



9) Return to the PRESET SCREEN. It will look like this:

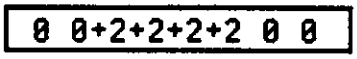


The cursor will be over the word "MOVE." Click on either of the UP/DOWN BUTTONS and the word "MOVE" will change into the word "CLEAR." We are now going to wipe the blackboard clean and CLEAR the RECORDER. Move the cursor until it is over the word "PSET" (PRESET.) Click on either of the UP/DOWN BUTTONS and the word "PSET" turns into "RECRDR" (RECORDER). The screen will now look like this:

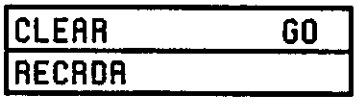


10) Put the cursor over the word "GO" and then press the GO/SET BUTTON. The "GO" will turn into "OK." You have now just cleared the contents of the RECORDER.

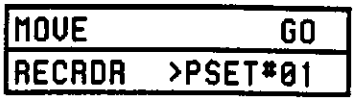
11) Back once again to the ALGORITHM SCREEN and this time, change the algorithm to look like this:



12) Bounce back again to the PRESET SCREEN. It will look like this:



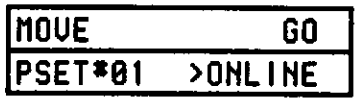
13) The cursor will be over the word "CLEAR." Click on either of the UP/DOWN BUTTONS and the screen will return to its MOVE mode and look like this:



14) As before, place the cursor over to the "#Ø1" and change it to "#Ø3." This will now move the RECORDER into PRESET #Ø3. Cursor over the word "GO," press the GO/SET BUTTON The "OK" tells you that it's now saved.

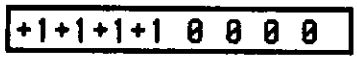
15) Now, cycle power to the *Feel Factory* !!!

16) Go to the PRESET SCREEN and place the cursor over the word "RECRDR." Click on the DOWN BUTTON once and the screen will look like this:



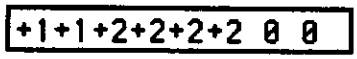
17) You guessed it! Put the cursor over the "Ø1" and change it to "Ø2." We are going to MOVE PRESET #Ø2 into ONLINE and RECORDER memory. Cursor over to the word "GO" and press the GO/SET BUTTON. The "GO" will turn into an "OK." If there is nothing saved in this PRESET, the "GO" will not turn into an "OK."

18) Go back to the ALGORITHM SCREEN and see that it looks like this:



19) Return to the PRESET SCREEN and move PRESET#Ø3 into ONLINE by changing the PRESET# to "#Ø3." Then placing the cursor over the word "GO" and pressing the GO/SET BUTTON.

20) Go to the ALGORITHM SCREEN and it will look like this:



See that PRESET #Ø2 wrote over only part of the algorithm. The part that you changed in step #11 and moved from the RECORDER into PRESET#Ø2. Those parts that you did not change were not written in the RECORDER and therefore not stored in the PRESET. This is how you can save part of a feel setting, recall it and not disturb the rest of the setup.

If you do want to save all of the feel settings and not just part of them, it's easy. Do it like this:

a) MOVE the PRESET that is your basic setup into ONLINE (and RECORDER). If you took my suggestion and made your basic setup PRESET#Ø1, the *Feel Factory* will MOVE it for you automatically when you power up the machine.

b) Make whatever changes you want to make.

c) MOVE the RECORDER into the PRESET# that you want to save it in. The difference is that you didn't CLEAR the RECORDER (erase the blackboard) before you made the changes. So now you are saving the old preset and the changes you have made into the new preset.

SOME OF OUR FAVORITE "FEEL" ALGORITHMS

If you think you've got it now, let's have some fun.

We thought you might be interested in some hints as to what the algorithms we've been talking about can do for your sequences. Follow along with this exercise, and you'll get a few clues. These are the algorithms we'll be using:

1. "DETROIT" - Emulates the feel of bass lines on late-60's Motown records. Algorithm screen looks like this:

AL1 PLC TMUL PT8
-3+3-3+3-3+3-3+3

This algorithm is then assigned to the fader controlling the bass line of the sequence. The fader screen would look like this:

FDR 1 TM CH 02
AL 1/0

The channel assignment on this screen is arbitrary, please assign the channel that corresponds to the bass line of your sequence.

2. "REGGAE" - A series of algorithms applied to drums and bass lines to emulate that Caribbean thang.

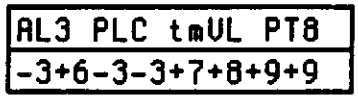
The bass algorithm screen looks like this:

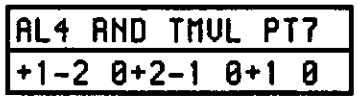
AL2 PLC TMUL PT8
0+3-4-5 0 0 0-5

Assign this algorithm to your bass line as before, or if you want it to really skank, combine it with the "DETROIT" algorithm. Your fader screen would then look like this:

FDR 1 TM CH 02
AL 1/2

The Hi-Hat assignment is a combination of two algorithms that look like this:





Make the fader assignment screen look like this (refer to the manual for range assignments):

Notice that AL Ø4 has seven parts so that in the 4/4 time signature of a reggae tune you have that random hi-hat feel that a Rasta man should. Also notice that the Fader is assigned to control velocity.

The Kick drum algorithm is as follows:

This would be the Fader screen:

The Snare algorithm screen looks like this:

And the fader assignment is:

FDR 4 VL ANG 03
AL 6/0

Increase the velocity (move the fader up) of the Hi-hat and Kick (faders 2 & 3) and decrease the velocity (move the fader down) of the snare (fader 4).

Note from the Designer (message from Michael)

My wish for the *Feel Factory* is that in addition to being a device that will save you hours and frustration, it will be a research engine in the "feel frontier." You will come up with feels that no one else will. It is my hope that these feels can be shared through a "feel network" in order for all to more fully enjoy this new field. If you're interested in joining up, please write me at:

Aphex Systems Ltd.

11068 Randall Street

Sun Valley, California 91352

Let's have some fun out there, Factory Workers!

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Warning: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.
We suggest the use of quality MIDI cables which are shielded according to the MIDI Standard.